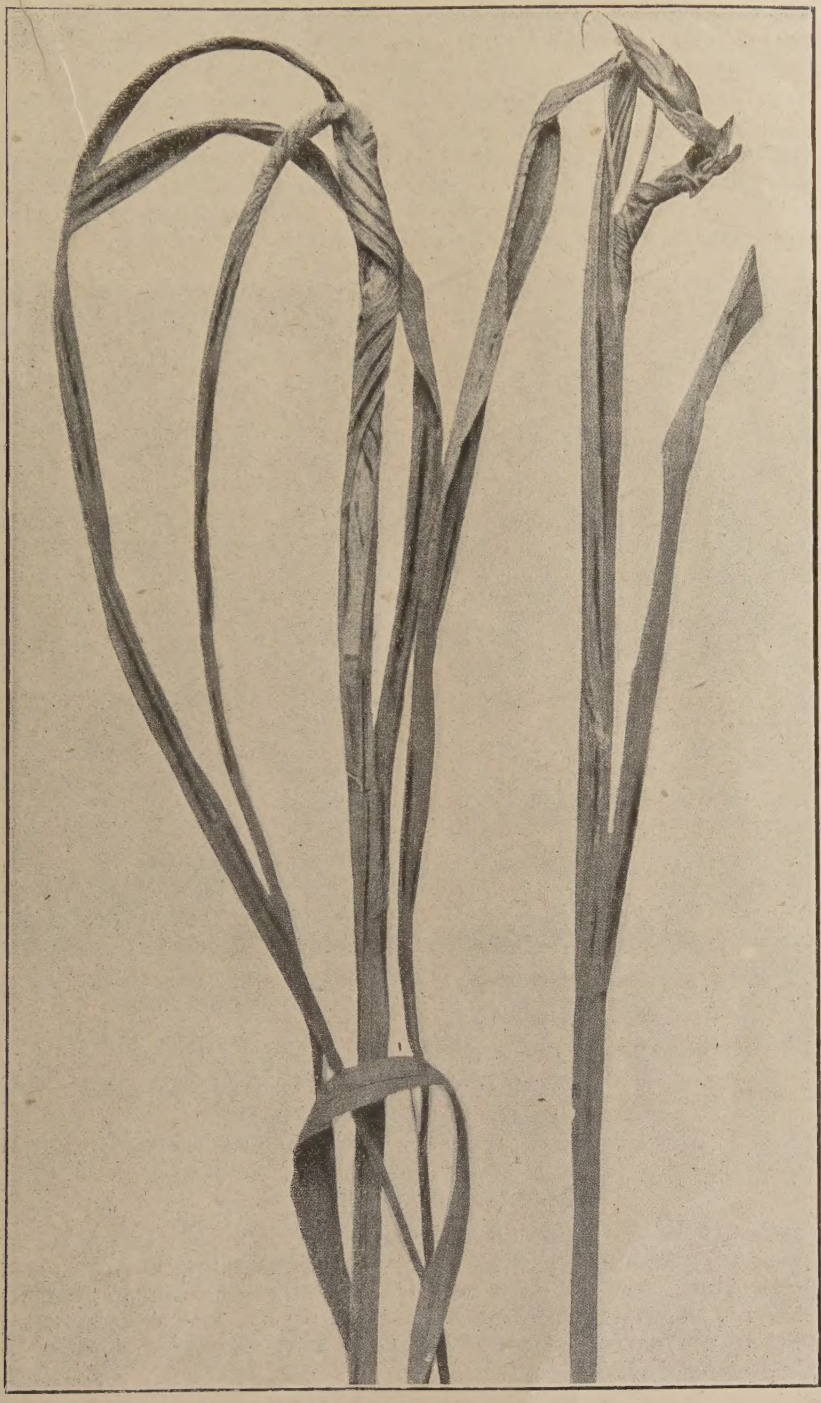

Fig. 1.—Flag Smut of Wheat.

[From *The Smuts of Australia*, by D. McAlpine.]

broken, liberates the mass of spores which, together with fragments of flag, are mixed with the surface soil and form a centre of infection for the following crop.

As a rule, affected plants do not reach maturity, but one or two straws on a stool may occasionally produce a few shrivelled grains. Plants in which the disease develops while they are still young die out. Often, however, the disease is not pronounced until the crop is half grown, and then it happens that a crop which promised well in the early stages of growth becomes a partial failure. (Figs. 2 and 3.)

Fig. 2.—Clean and Flagsmutted Wheat.

A. Twenty-one healthy plants.

B. Twenty-one diseased plants.

[From *The Smuts of Australia*, by D. McAlpine.]

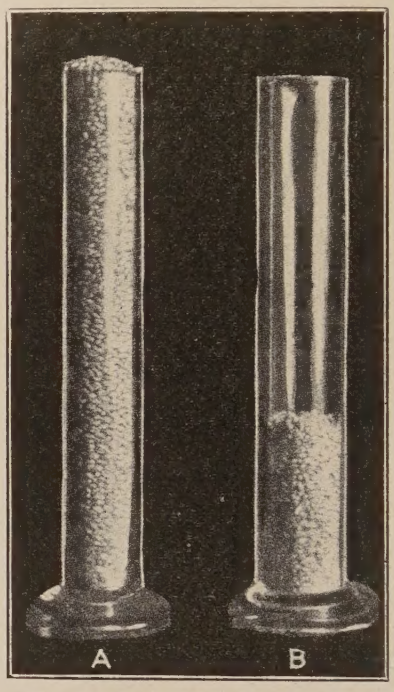

Fig. 3.—Grain from Healthy and Diseased Plants.

A. Yield of twenty-one healthy plants, about 8 ozs.

B. Yield of twenty-one diseased plants, exactly 2½ ozs.

[From *The Smuts of Australia*, by D. McAlpine.]

Infection of the Plant.

Infection of the plant takes place in the very early stages of its growth, viz., seedlings, and in the young shoots which are developed later, and not after the plant is above ground. The fungus remains within the tissues of the plant for varying periods, and only becomes visible to the naked eye after the spores have developed within the leaf.

Loss caused by the Disease.

The actual loss by the disease in Victoria is difficult to estimate, but some idea may be formed when we hear of cases in which 10 per cent. of the crop was destroyed. In one instance which was brought under my notice quite one-third of the crop was killed out in a certain district. Mr. McAlpine, in *The Smuts of Australia*, page 92, mentions a loss of 70 per cent.

Contamination of the Soil.

Contamination of the soil is the most difficult problem in dealing with the control of Flag Smut.

The factors affecting the contamination of the soil are so many and varied, and so intimately connected with the working of the average farm, that it seems almost hopeless to guard completely against the disease. Certain precautions, however, can be taken, more especially when we know the channels by which the disease reaches virgin and other soils. If these be observed. the loss will at least be lessened.

Soil is contaminated through the working horses being fed upon chaff cut from diseased wheaten hay, by animals feeding upon stubble paddocks which have borne a diseased crop, by fragments of diseased flag blown by the wind, or carried by animals or farm implements, and by the spores of the fungus on the seed wheat.

Control.

In all cases where land becomes infected, it is very difficult to eradicate the disease. The cost of fungicides make their application out of the question.

Several sources of contamination are known, and they should be guarded against. Care should be taken to see that chaff is free from disease. Seed should be immersed in a pickle consisting of one and one-half pounds of bluestone to ten gallons of water. If a crop is diseased the stubble should be burnt and not fed off by sheep or cattle. Fallows must be well worked. Sowing should be done, if possible, after rain, and a rotation of crops observed. These are the only known methods of control. Flag Smut affects wheat only, therefore an oat crop will help to clear up a diseased area.

The question often arises: How long will the spores of Flag Smut retain their vitality in the soil? Up to the present, there is no definite evidence on this point, and the data necessary to answer the question will not be available for a number of years.

The breeding of a wheat immune to Flag Smut is of the greatest importance, and, if possible, attempts should be made by plant-breeders in this direction. Success to a greater or less extent has been achieved in the breeding of a rust-proof wheat, but this, perhaps, is of less importance to Victorian growers than the raising of one proof against Flag Smut.

CROP COMPETITIONS IN THE WIMMERA.

RUPANYUP DISTRICT.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Chief Field Officer, Department of Agriculture.

I have much pleasure in forwarding my report as judge of the recent crop competitions held under the auspices of your Society.

Some Impressions of the District.

Rupanyup occupies a position on the south-eastern edge of the extensive belt of black Wimmera soils which are famed for their fertility. Those in the vicinity of Rupanyup comprise some of the most fertile of the whole area, and form what is called the Lallat plain.

In addition, especially towards Marnoo, there are large areas of red soil which have a tendency to set down with wet, and which are consequently much more difficult to manage than the black soil. Both these types of soil are well suited to wheat and sheep raising—though the black is superior—and are being actively farmed. There is, however, a considerable area in the district still being used as a sheep run.

According to the official records, the average rainfall is 16.97 inches annually, and with it fine wheat crops are grown. There are, however, a number of wheat-growing problems peculiar to the district, especially on the red land. The most satisfactory way of solving these is by means of carefully conducted tests in the field, but another way which is of assistance, and by which farmers can help themselves and each other, is an annual district survey of the crops and of the methods by which they have been grown.

The crop competitions, such as have been held during the past two years, offer a splendid opportunity for discovering the best crops each year, and of accounting for their superiority by a consideration of the methods by which they have been raised.

The soil and seasonal influences would, of course, have to be taken into account. Any deductions that may be made by the examination and comparison of a large number of cases have a local value of the highest importance.

There is every reason, therefore, why a crop competition should not be looked upon as a mere struggle for a prize, but rather as a contest of which a wider view must be taken.

A pleasing feature of the Rupanyup district is the superior type of some of the homes with gardens that one sees dotted over the countryside. They reflect the general prosperity that the district enjoys. There is a marked absence of those tumbledown farm buildings which still, unfortunately, mar the landscape in some of our prosperous districts of the wheat belt. That general public attention has in the past been directed to improving the farm homes at Rupanyup is evidenced by the fact that, some years years ago, a farm competition was held annually, though recently it has been allowed to lapse.

No more convincing example of the soundness of the district, and of the fertility of the black Wimmera soils, could be instanced than that supplied by the career of Mr. J. Ramsay.

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FACTORS FOR SUCCESSFUL WHEAT CULTURE

No. 2

Liberal Manuring

The Result of Five Years' Tests show that of all Manures tried ***Superphosphate*** in Heavy Dressing is the Most Profitable.

IMPERIAL BUREAU
4 OCT. 1922
MYCO OG

5 YEARS RESULTS AT LONGERENONG

PLOT.	Average Yield per Acre.	Average Increase due to Manure per Acre.	Net Profit per Acre. Valuing the Increase at 4/- per bushel, and deducting cost of Manure.
	Bushels.	Bushels.	
No Manure	24·3	—	—
Basic Slag, 1 cwt. ...	26·4	2·1	3/4
Super. ½ ,, ...	30·4	6·1	21/10½
Super. 1 ,, ...	31·4	7·1	23/4½
Super. 2 ,, ...	33·1	8·8	25/2

Liberal Manuring Feeds both the Wheat and the Grass that follows the Wheat

FACTORS FOR SUCCESSFUL WHEAT CULTURE

No. 3

Rational Use of Seed

1. Choose Varieties Suited to Your District

Make a choice from the following varieties :—

Early Maturing Types	Mac's White Gluyas, Bunyip, King's Early, Steinwedel.
Midseason Types	Federation, Penny, Dart's Imperial.
Late Maturing Types	Currawa, Major, Marshall's, Yandilla King.

Sow Late Maturing Types First, and Early Maturing Types Last.

Increase Dressing of Seed and Fertilizer towards close of Seeding Season.

2. Grade the Seed

Results of Graded Seed Tests Wyuna State Farm :—

PLOT.	Yield per Acre.
Normal Seed (direct from Harvester) ..	**25 bush., 27 lbs.**
Grade No. 1	**28 bush., 6 lbs.**
Grade No. 2	**27 bush., 53 lbs.**
Grade No. 3	**23 bush., 50 lbs.**

Grade the Seed and Feed No. 3 Grade and Screenings to the Stock.

3. Select the Seed

Average Results of 5 years Seed Selection at Longerenong :—

Selected Federation .. 36·1 bushels per acre.
Ordinary ,, .. 30·3 ,, ,,

4. Pickle the Seed

Keep Smut from the Farm by Pickling with Bluestone (1½ lbs. to 10 gallons water); or Formalin (1 lb. to 50 gallons water).

Immerse Seed in Pickle from 3 to 5 minutes.

FACTORS FOR SUCCESSFUL WHEAT CULTURE

No. 4

Regular Rotation of Crops

Advantages of Crop Rotation in the Wheat Belt.

(1). "Take-all," Flag-smut, and other diseases avoided.
(2). Farm work distributed evenly through the year.
(3). More sheep can be kept.
(4). Soil fertility easily maintained.
(5). Heavy wheat assured.
(6). Most profitable in every way.

Grow Wheat in Rotation with Fallow, Cereals, and Pasture

Systems of Crop Rotation Recommended.

1. For the Mallee—

(1) Wheat. (2) Pasture. (3) Bare Fallow.

2. For the Wimmera—

(1) Wheat. (2) Oats. (3) Pasture. (4) Bare Fallow.
or (2) Wheat. (2) Oats for Sheep. (3) Bare Fallow.

3. In drier districts sow Catch Crops for early Autumn feed.

In moister districts include Forage Crops, *e.g.*, Rape, Peas, or Oats, regularly in the Rotation.

KEEP SHEEP ON EVERY WHEAT FARM

FLAG SMUT.

(*Urocystis tritici*, Koern.)

By C. C. Brittlebank, Plant Pathologist.

Numerous inquiries have recently been received from wheat-growers as to the cause and control of Flag Smut in wheat, a disease which has increased to an alarming extent in some wheat-growing areas. Mr. McAlpine's work, *The Smuts of Australia,* published by the Department of Agriculture, Victoria, 1910, contains all that is known on the subject, and this book should be in the hands of every grower, as it not only deals with Flag Smut, but with all the known Smuts affecting cereals.

Flag Smut is one of those insidious diseases which cause loss right through the growing season, and often, where its presence is unsuspected, weather and other conditions are held responsible for the damage. On the other hand, Rust, under favourable weather conditions, spreads rapidly and ruins the crop within a few days, and the impression made by its sudden appearance and the damage done leads many to regard it as the most serious disease by which our wheat crop is attacked. Considering, however, that Rust epidemics are few and far between, while Flag Smut is annually taking toll of from 5 per cent. to nearly 70 per cent., the total loss caused by Rust sinks into insignificance when compared with that resulting from Flag Smut.

Organism causing the Disease.

The organism responsible for the injury to the wheat plants is one of the microscopic fungi, commonly known as Smuts from the appearance of their sooty spore mass. As this fungus chiefly affects the flag, the common name Flag Smut has been accepted; scientifically, it is known as *Urocystis tritici,* Koern.

This fungus was first noticed in Australian wheat, its first appearance having been reported from South Australia in 1868, and at a later date it was observed in Indian and Japanese wheat crops. It was only recently, however, that it appeared in growing wheat in the United States of America, and most probably it was carried into that country in shipments of wheat from Australia.

Many fungus diseases are introduced by means of seed of various kinds, and, therefore, the strictest examination should be made of all seed imported from a country where any destructive fungus disease is known to exist.

Appearance of Diseased Plants.

Wheat plants show the outward visible effects of attack from the time they are seedlings to a stage not far removed from maturity. Generally, long dark leaden-coloured streaks, caused by the black spores under the epidermis of the flag, appear on the flag and sheath. At a later stage, the flag twists, curls, and withers (Fig. 1), and, becoming